

IN THE CLAIMS

Claims 1-17 are cancelled herein. Claims 18-38 have been added. All pending claims
are reproduced below.

1 1. (Cancelled)

1 2. (Cancelled)

1 3. (Cancelled)

1 4. (Cancelled)

1 5. (Cancelled)

1 6. (Cancelled)

1 7. (Cancelled)

1 8. (Cancelled)

1 9. (Cancelled)

1 10. (Cancelled)

1 11. (Cancelled)

1 12. (Cancelled)

1 13. (Cancelled)

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1 15. (Cancelled)

1 16. (Cancelled)

1 17. (Cancelled)

1 18. (New) A method for compiling a functional description expressed in an
2 interpretive, algorithmic language into target code for selected hardware, the method comprising
3 the steps of:

4 receiving the functional description expressed in the interpretive, algorithmic
5 language with at least one undeclared variable;

6 assigning a type and a dimension to the at least one undeclared variable by
7 analyzing the functional description to form an abstract syntax tree;

8 transforming compound statements in the abstract syntax tree into a series of
9 single statements; and

10 translating the abstract syntax tree into a register transfer level format.

$\equiv RTL$

1 19. (New) The method for compiling a functional description of claim 18, further
2 comprising the steps of:

3 receiving a user directive file including at least one user defined directive selected
4 from the group consisting of constraint directives, assertions, and compiler hints; and
5 annotating the functional description according to the user directive file.

1 20. (New) The method for compiling a functional description of claim 18, further
2 comprising the steps of:

3 analyzing a value range of the at least one undeclared variable; and
4 assigning a required precision for the at least one undeclared variable.

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1 21. (New) The method for compiling a functional description of claim 20, further
2 comprising the step of:

3 parsing a real undeclared variable into an integer part and a fractional part,
4 wherein said real undeclared variable is one of said at least one undeclared variable.

1 22. (New) The method for compiling a functional description of claim 18, further
2 comprising the steps of :

3 analyzing array access patterns across loop iterations; and

4 replacing a statement in a loop including a memory access with multiple
5 statements including the memory access to reduce the number of individual memory
6 accesses.

1 23. (New) The method for compiling a functional description of claim 18, further
2 comprising the steps of:

3 analyzing compound loop structures to identify pipeline opportunities; and
4 applying the pipeline algorithm to pipeline opportunities to generate nodes
5 corresponding to the loop body, predicate nodes corresponding to loop conditional
6 statements, and a schedule for scheduling pipeline operations.

1 24. (New) The method for compiling a functional description of claim 18, wherein
2 the step of transforming compound statements in the abstract syntax tree into a series of single
3 statements comprises the step of:

A3⁴ expanding a matrix operation into at least one loop.

1 25. (New) The method for compiling a functional description of claim 18, wherein
2 the step of transforming compound statements in the abstract syntax tree into a series of single
3 statements comprises the step of:

4 deconstructing a compound statement into at least one simple statement.

1 26. (New) A system for compiling a functional description expressed in an
2 interpretive, algorithmic language into target code for selected hardware comprising:

3 a parser for receiving the functional description expressed in the interpretive,
4 algorithmic language with at least one undeclared variable;

5 a type-shape analyzer, coupled to the parser, for assigning a type and a dimension
6 check spec. to the at least one undeclared variable by analyzing the functional description to form an
7 abstract syntax tree;

8 a statement deconstructor, coupled to the type-shape analyzer, for transforming a
9 compound statement in the abstract syntax tree into at least one simple statement; and
10 a translator, coupled to the statement deconstructor, for translating the abstract
11 syntax tree into a register transfer level format.

1 27. (New) The system for compiling a functional description of claim 26, further
2 comprising:

// input file or input file by user.

3 a user directive file, coupled to the parser, for annotating the functional
4 description with at least one user defined directive selected from the group consisting of
constraint directives, assertions, and compiler hints.

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1 28. (New) The system for compiling a functional description of claim 26, further
2 comprising:

3 a precision analyzer, coupled to the type-shape analyzer, for determining the
4 precision of the at least one undeclared variable.

1 29. (New) The system for compiling a functional description of claim 28, further
2 comprising:

3 a real number parser, coupled to the precision analyzer, for parsing a real number
4 into an integer part and a fractional part.

1 30. (New) The system for compiling a functional description of claim 26, further
2 comprising:

3 a memory access optimizer, coupled to the statement deconstructor, for analyzing
4 array access patterns across loop iterations and replacing a statement in a loop including a
5 memory access with multiple statements including the memory access to reduce the
6 number of individual memory accesses.

1 31. (New) The system for compiling a functional description of claim 26, further
2 comprising:

3 a pipeline optimizer, coupled to the statement deconstructor, for analyzing
4 compound loop structures to identify pipeline opportunities and applying the pipeline
5 algorithm to pipeline opportunities to generate nodes corresponding to the loop body,
6 predicate nodes corresponding to loop conditional statements, and a schedule for
7 scheduling pipeline operations.

1 32. (New) The system for compiling a functional description of claim 26, wherein the
2 statement deconstructor for transforming a compound statement in the abstract syntax tree into at
3 least one simple statement comprises:

4 a scalarizer, coupled to the type-shape analyzer, for expanding a matrix operation
5 into at least one loop.

1 ~~33~~ 34. (New) One or more computer readable storage devices having computer readable
2 code embodied on said computer readable storage device, said computer readable code for
3 programming one or more computers to perform a method for compiling a functional description
4 expressed in an interpretive, algorithmic language into target code for selected hardware, the
5 method comprising the steps of:

6 receiving the functional description expressed in the interpretive, algorithmic
7 language with at least one undeclared variable;

8 assigning a type and dimension to the at least one undeclared variable by
9 analyzing the functional description to form an abstract syntax tree;

10 transforming compound statements in the abstract syntax tree into a series of
11 single statements; and

12 translating the abstract syntax tree into a register transfer level format.

A13 34/35 (New) One or more computer readable storage devices having computer readable
2 code embodied on said computer readable storage device, said computer readable code for
3 programming one or more computers to perform a method for compiling a functional description
4 of claim 34, further comprising the step of:

5 receiving a user directive file including at least one user defined directive selected
6 from the group consisting of constraint directives, assertions, and compiler hints; and

7 annotating the functional description according to the user directive file.

1 36/35 (New) One or more computer readable storage devices having computer readable
2 code embodied on said computer readable storage device, said computer readable code for
3 programming one or more computers to perform a method for compiling a functional description
4 of claim 34, further comprising the step of:

5 analyzing a value range of the at least one undeclared variable; and

6 assigning a required precision for the at least one undeclared variable.

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1 ~~37.~~ (New) One or more computer readable storage devices having computer readable
2 code embodied on said computer readable storage device, said computer readable code for
3 programming one or more computers to perform a method for compiling a functional description
4 of claim ~~34~~, further comprising the step of:

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5 analyzing array access patterns across loop iterations; and
6 replacing a statement in a loop with a memory access with multiple statements
7 with the memory access to reduce the number of individual memory accesses.

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end

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1 ~~38.~~ (New) One or more computer readable storage devices having computer readable
2 code embodied on said computer readable storage device, said computer readable code for
3 programming one or more computers to perform a method for compiling a functional description
4 of claim ~~34~~, further comprising the step of:

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5 analyzing compound loop structures to identify pipeline opportunities; and
6 applying the pipeline algorithm to pipeline opportunities to generate nodes
7 corresponding to the loop body, predicate nodes corresponding to loop conditional
8 statements, and a schedule for scheduling pipeline operations.